

Section II. (REMARKS)

The pending claims in the application are 15-37.

Amendment to the Claims

Claim 15 and 36 have been amended to replace the transition phrase “comprising” with “consisting essentially of,” without prejudice. Support for said amendment can be found in the instant application at paragraph [0028].

No new matter has been added herein.

Rejection of Claims and Traversal Thereof

In the May 2, 2007 Office Action:

claim 36 was rejected under 35 U.S.C. §112, first paragraph;

claims 15-23, 25-27, 30, 35 and 37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1);

claims 24 and 28-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal in view of De Young et al. (U.S. Patent No. 6,669,785);

claims 31-34 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) in view of Xu et al. (U.S. Patent Application Publication No. 2003/0125225); and

claim 36 was rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal in view of Hess et al. (U.S. Patent No. 6,627,588).

These rejections are traversed and reconsideration of the patentability of the pending claims is requested in light of the following remarks.

Rejection under 35 U.S.C. §112, first paragraph

In the May 2, 2007 Office Action, claim 36 was rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement. Applicants traverse such rejection.

As previously introduced, to satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention at the time of filing. MPEP §2163 (I) (citing *Vas-Cath, Inc. v. Mahurkar*, 19 U.S.P.Q.2d 1111, 1116 (Fed. Cir. 1991)). Claim limitations may be supported in the specification through express, implicit or inherent disclosure. See, MPEP §2163. Express disclosure is not the standard - a specification that implicitly or inherently discloses the claimed invention also satisfies the written description requirement.

According to the Examiner:

“As to 1112, [sic] first paragraph rejection, applicant’s showing of the [paragraphs] 0016, 0030 and 0042-0045, do not inherently provide the supporting of the presence of the at least one implanted ion **prior to contacting or soaking** the ion implanted photoresist layer. Examiner also pointed that no wherein the specification discloses that the removal composition having the implanted ion **prior to soaking or contacting** the composition with the material (photoresist) to be removed.” (see, May 2, 2007 Office Action, page 2, lines 11-16)

For ease of reference, applicants’ claim 36 recites:

“A method of removing an ion implanted photoresist layer and a bottom anti-reflection coating (BARC) layer from a substrate having same thereon, said method comprising contacting the substrate having the photoresist layer and the BARC layer thereon with a SCF-based removal composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, at least one implanted ion, and at least one surfactant, for sufficient time and under sufficient contacting conditions to at least partially remove the ion-implanted photoresist layer and the BARC layer from the substrate, wherein the contacting conditions comprise temperature in a range of from about 50°C to about 90°C.”

Applicants question where in claim 36 is the recitation that the removal composition only corresponds to one “prior to soaking or contacting?” The removal composition of the invention is a solvent based solution that is intended to be contacted with substrates having photoresist layers and BARC layers until the ion-implanted photoresist layer and the BARC layer are at least partially removed.¹ It is not reasonable to assume that the ion-implanted photoresist layers and the BARC layers only come in contact with clean, virgin SCF-based removal chemistries. The costs to the manufacturer, the consumer and the environment would be astronomical. Moreover, this is not temporally feasible – the SCF-based removal composition will include a microscopic amount of removed ion-implanted photoresist layers and the BARC layers immediately upon contact (within a nanosecond) with said materials. If the user had to use clean chemistries to remove each microscopic batch of ion-implanted photoresist layers and the BARC layers, the process of removing a layer of materials would take months, maybe years.

An analogous situation is the process of washing clothes in a washing machine. The process begins with clean water and detergent, but immediately after you add that first muddy sock to the tub, the solution includes water, detergent and soil. The process of removing additional soil from the sock is not affected using this “new” solution including water, detergent and soil, at least until the solution is saturated with soil or the detergent is exhausted.

Considered *in toto*, the Examiner is relying on verbiage, specifically “prior to contacting or soaking,” that is not in claim 36 in an attempt to establish a *prima facie* case of lack of written description. This phrase is not in claim 36 and cannot be relied on by the Examiner. Clearly, the SCF-based removal composition may include ion-implanted photoresist, and hence at least one implanted ion, immediately upon contact with said material and the method can continue to be practiced as recited in claim 36.

Accordingly, withdrawal of the rejection of claim 36 under §112, first paragraph, is respectfully requested.

Rejection under 35 U.S.C. §103(a)

¹ As previously stated in the response to the January 30, 2007 Advisory Action, the substrate may be statically soaked, without reuse or recycling. Applicants should not be required to limit claim 36 to recycling or reusing because these do not represent the only conceivable moments when applicants’ removal composition may include at least one implantation ion.

1. In the May 2, 2007 Office Action, claims 15-23, 25-27, 30, 35 and 37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal (U.S. Patent Application Publication No. 2004/0050406A1) (hereinafter Sehgal). Applicants traverse such rejection.

It is initially noted that the Examiner stated in the May 2, 2007 Office Action that Sehgal teaches a "temperature range of 31 degree C to 110 degree C" (see, May 2, 2007 Office Action, page 2, line 19). Applicants vigorously disagree with the Examiner's interpretation of Sehgal. Sehgal does not teach a temperature range of 31°C to 110°C, but rather a process carried out only at 43°C, 100°C or 110°C. Although it is a well known fact that the critical temperature of CO₂ is 31°C, there is absolutely no teaching or suggestion in Sehgal that the temperature range of the process may be from 31°C to 110°C. Applicants request that the Examiner acknowledge same.

In addition, the Examiner stated that Sehgal teaches a higher temperature of 80°C at paragraph [0058]. As previously introduced in the response to the October 24, 2006 Office Action, Sehgal does not teach the use of a supercritical fluid at 80°C, but rather a photoresist/solvent solution at ambient pressure (15 psi) and 80°C. It is not possible to convert CO₂ to the supercritical state at a pressure of only 15 psi. Applicants request that the Examiner review the teaching of paragraph [0058] and acknowledge that Sehgal does NOT actually teach cleaning at 80°C using a supercritical fluid.

That said, to expedite allowance of the present case, applicants have amended claim 15 to recite:

"A method of removing a bottom anti-reflection coating (BARC) layer from a substrate having same thereon, said method comprising contacting the substrate having the BARC layer thereon with an SCF-based removal composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant, for sufficient time and under sufficient contacting conditions to substantially remove the BARC layer from the substrate." (emphasis showing added limitation(s))

Notably, "substantial removal" is defined in the instant application at paragraph [0057].

Sehgal relates to a composition including a co-solvent mixture, wherein said co-solvent mixture includes an organic solvent, optionally an oxidizer, optionally an accelerator (e.g., carboxylic acids, amines, etc.), optionally an aqueous fluoride, optionally a buffering agent, optionally a

corrosion inhibitor, optionally a surfactant and optionally a chelating agent, wherein the composition may be applied to a substrate under ambient or supercritical conditions. Specific examples include (1) a carbonate, DMSO, and H_2O_2 , (2) a carbonate, benzyl alcohol, and H_2O_2 , (3) a carbonate, DMSO, H_2O_2 and NH_4F , (4) an accelerator added to each of examples (1)-(3), (5) a carbonate, benzyl alcohol, formic acid, an accelerator, and H_2O_2 , (6) a carbonate, benzyl alcohol, hydroxyl propyl carbamate, and H_2O_2 , and (7) a carbonate, benzyl alcohol, trioxane and H_2O_2 .

As noted, presently pending claim 15 has been amended to recite a SCF-based removal composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant and at least one surfactant.

It is well established as a matter of law that the transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention. *In re Herz*, 190 USPQ 461, 463 (CCPA 1976) (emphasis in original).

Clearly, the presence of an oxidizer, e.g., H_2O_2 , which is present in every Sehgal embodiment, will materially affect the basic and novel characteristics of the claimed invention. Moreover, Sehgal does not specifically teach that the composition may consist essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant. Seven different components are optional in the Sehgal composition and the only real direction provided is in the seven embodiments. Any suggestion that Sehgal discloses a composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant, amounts to hindsight reconstruction, which is legally impermissible.

As stated in the MPEP, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970). In the present case, Sehgal does not teach or suggest a composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant. As such, there exists no *prima facie* case of obviousness.

Withdrawal of the rejection of claims 15-23, 25-27, 30, 35 and 37 as being rejected under 35 U.S.C. §103(a) over Sehgal is respectfully requested.

2. In the May 2, 2007 Office Action, claims 24 and 28-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal in view of DeYoung et al. (U.S. Patent No. 6,669,785) (hereinafter DeYoung). Applicants traverse such rejection.

As introduced hereinabove, Sehgal does not make obvious applicants' claimed invention because applicants' removal composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant is not reasonably disclosed in Sehgal. DeYoung does not cure this deficiency.

DeYoung relates to a two-step process whereby a second cleaning fluid comprising an adduct of hydrogen fluoride with a Lewis base in CO₂, and a first cleaning fluid comprising an amine and a cosolvent in CO₂, whereby the first cleaning fluid is introduced before, after, or both before and after the introduction of the second cleaning fluid. In other words, at no time are substantial amounts of the first cleaning fluid and the second cleaning fluid in contact with each other. In fact, typically there is a pure SCCO₂ rinse step before the introduction of the latter fluid to the vessel.

Turning to the present case, the combination of Sehgal, which is a one step cleaning process, with DeYoung, which is a two-step cleaning process, does not reasonably teach or suggest applicants' claimed invention whereby the SCF-based removal composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant is used to substantially remove BARC material from a substrate having said BARC thereon. Moreover, prior art references must be considered as a whole. Applicants question whether the cleaning process should be one step, per Sehgal, or two-step, per DeYoung, after combining the two teachings as proposed by the Examiner. The Examiner is not permitted to cherry pick the preferred process (or the triethylamine trihydrofluoride from DeYoung) in an attempt to establish a *prima facie* case of obviousness.

In conclusion, applicants request that the Examiner withdraw the rejection of claims 24 and 28-30 as being unpatentable over Sehgal in view of DeYoung.

3. In the May 2, 2007 Office Action, claims 31-34 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal in view of Xu et al. (U.S. Patent Application Publication No. 2003/0125225) (hereinafter Xu). Applicants traverse such rejection.

Xu relates to the utilization of a SCF-based cleaning composition including co-solvent(s), surfactant(s), chelating agent(s) and/or active agent(s), whereby the active agents include acids, bases, reducing agents and oxidizing agents.

Similar to Sehgal, Xu does not specifically teach that the composition may consist essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant. Any suggestion that Xu discloses a composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant, amounts to hindsight reconstruction, which is legally impermissible. Accordingly, Xu does not cure the deficiencies of Sehgal.

In conclusion, applicants request that the Examiner withdraw the rejection of claims 31-34 as being unpatentable over Sehgal in view of Xu.

4. In the May 2, 2007 Office Action, claim 36 was rejected under 35 U.S.C. §103(a) as being unpatentable over Sehgal in view of Hess et al. (U.S. Patent No. 6,627,588) (hereinafter Hess). Applicants traverse said rejection.

Hess relates to a method of removing photoresist using a composition including isopropyl alcohol. Notably, Hess does not teach or suggest the use of the composition under supercritical conditions.

As introduced hereinabove, claim 36 has been amended to recite that the SCF-based removal composition consists essentially of at least one SCF, at least one co-solvent, at least one etchant, at least one implanted ion, and at least one surfactant. Further, as discussed hereinabove, Sehgal does not reasonably teach or suggest the use of a composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, and at least one surfactant. As such, Sehgal does not reasonably teach or suggest the use of a composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, at least one implanted ion, and at least one surfactant.

Similar to Sehgal, Hess does not specifically teach that the composition may consist essentially of at least one SCF, at least one co-solvent, at least one etchant, at least one implanted ion, and at least one surfactant. Any suggestion that Hess discloses a composition consisting essentially of at least one SCF, at least one co-solvent, at least one etchant, at least one implanted ion, and at least one surfactant, amounts to hindsight reconstruction, which is legally impermissible. Accordingly, Hess does not cure the deficiencies of Sehgal.

In conclusion, applicants request that the Examiner withdraw the rejection of claim 36 as being unpatentable over Sehgal in view of Hess.

Petition for Extension of Time/Fees Payable

Applicants hereby petition for a one (1) month extension of time, extending the deadline for responding to the May 2, 2007 Office Action from August 2, 2007 to September 2, 2007.

The total fee of \$120.00 specified in 37 CFR §1.17(a)(1) for such one (1) month extension is being paid by Electronic Funds Transfer. Authorization is hereby given to charge any deficiency in applicable fees for this response to Deposit Account No. 13-4365 of Moore & Van Allen PLLC.

Conclusion

Claims 15-37 are now in form and condition for allowance. Favorable action is hereby requested. If any additional issues remain, the Examiner is requested to contact the undersigned attorney at (919) 286-8090 to discuss same.

Respectfully submitted,
MOORE & VAN ALLEN PLLC

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